

REMARKS

In the present Amendment, claim 1 has been amended to incorporate the subject matter of a part of claim 3 and the subject matter of claim 5. Claims 2, 5 and 9 have been cancelled. Claim 6 has been amended to depend from claim 1 and to recite that X (instead of Ar, so as not to be inconsistent with the specification) represents a polymer chain selected from a polypyrrole structure, a polythiophene structure, a polycarbazole structure, a polyaniline structure and an arylenevinylene structure which bonds B² group via an aromatic ring or a heterocyclic ring contained in the polymer chain. Support for the amendment to claim 6 (and also new claim 42) is found, for example, at page 29, lines 11 to 15 of the specification.

More particularly, the present invention relates to a self-doping type electrically conducting polymer comprising crosslinked polymer chains with crosslinking groups between one polymer chain and a second polymer chain, and the crosslinking is formed through a sulfone bond as required in amended claim 1. That is, since an isothianaphthene chain corresponds to one polymer chain and the crosslinked structure comprises -B¹--SO₂--B²- group in formula (1)' of claim 6, it is apparent that X (Ar) represents the second polymer chain. Applicants intended to recite that X is a polymer chain comprising a cyclic group. Therefore, because it corrects an obvious error, the amendment to "X" in claim 6 does not introduce new matter. Claims 7 and 10 have been amended to depend from claim 1. Claim 22 has been amended to incorporate the definition of formula (7) and formula (8) from claim 14. No new matter has been added, and entry of the Amendment is respectfully requested.

Upon entry of the Amendment, claims 1, 3-4 and 6-8 and 10-42 will be pending, of which claims 7-8, 10-12, 15, 17, 18 and 23 are withdrawn from consideration.

In the Response to Election of Species Requirement filed October 31, 2008, Applicants traversed to the extent that claims 7 and 8 are narrower than claim 6 from which they depend and that Formulae (2) and (3) in claims 7 and 8 are within the scope of Formula (1) in claim 6. Further, Applicants argued that similar reasoning applies to claim 15.

In response, the Examiner stated that neither Formula (2) of claim 7 nor Formula (3) of claim 8 has the $\text{Ar-B}^2\text{-SO}_2\text{-B}^1$ structure found in Formula (1). Specifically, the Examiner stated, the monovalent Ar- of Formula (1) in claim 6 is not found in either Formula (2) or Formula (3) of claim 7 or 8.

However, upon further consideration, the Examiner considered Formula (7) of claims 13, 14, 16, and 19 to not involve a sufficiently distinct species from Formula (1) in claim 6.

Accordingly, the Examiner modified the Requirement and made it final. As a result, claims 1-6, 13, 14, 16, 19-21 and 24-41 are examined. Claim 22 will be examined once the claim objection is addressed.

As noted, claim 6 has been amended to recite that X in Formula (1)' represents a polymer chain selected from a polypyrrole structure, a polythiophene structure, a polycarbazole structure, a polyaniline structure and an arylenevinylene structure which bonds to the B^2 group via an aromatic ring or a heterocyclic ring contained in the polymer chain.

Therefore, claims 7 and 8 are within the scope of Formula (1)' of claim 6 and properly depend from amended claim 6. If the elected species is found to be patentable, the Examiner is respectfully requested to examine the non-elected species which properly depend from an elected generic claim.

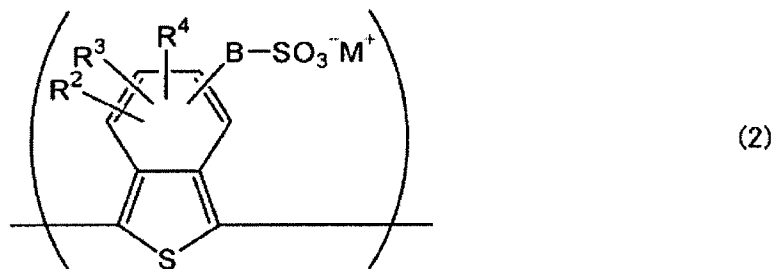
Claim 22 was objected to as being in improper form because it depends from both claims 14 and 21. Accordingly, the Examiner has not treated claim 22 on the merits.

In response, claim 22 has been amended to solely depend from claim 21. Withdrawal of the objection to claim 22 and examination of claim 22 on the merits are respectfully requested.

Claims 1-6, 13, 14, 16, 19, 20, 21, and 24-41 were *provisionally* rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over “claims” of co-pending Application No. 11/657,550 (see US 2007/0181857) in view of Saida (US 5,648,453).

This double patenting rejection should be withdrawn because the present claims are not obvious over the “claims” of the co-pending ‘550 application in view of Saida.

Claim 19 of the co-pending ‘550 application recites an electroconductive polymer of the following formula:

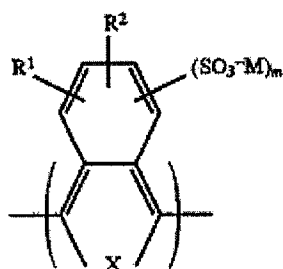


However, none of claim 19 of the co-pending ‘550 application and Saida discloses *crosslinked* polymer chains, and specifically polymer chains crosslinked through a sulfone bond as claimed in amended claim 1. This will be discussed in further detail below.

Claims 1-6, 13, 14, 16, 19, 20, 21, and 24-41 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Saida (US 5,648,453).

This rejection should be withdrawn because Saida does not disclose or render obvious the present invention.

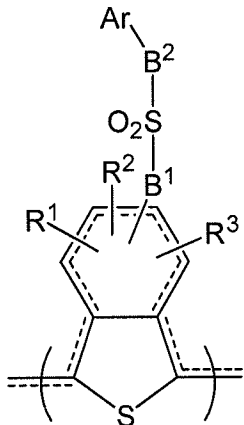
Saida was cited as teaching electroconductive polymers of the following formula (abstract):



(I)

The Examiner considered that Saida meets the B¹ and B² limitations of Formula (1) in present claim 6 when the p, q, and r values are all 0 for both B¹ and B² in Formula (1) (Applicants note that one of the q values should be 1). The Examiner stated that M⁺ may include one of many monovalent Ar groups (col. 5, lines 24-29), and that the self-doping function and various uses are taught at col. 29, lines 4-20.

The Examiner acknowledged that Saida does not teach the particular Formula (1) of present claim 6 (shown below).



(1)

However, the Examiner considered that Saida teaches a genus encompassing the presently claimed species and that it would have been obvious for self-doped electroconductive polymers to have the structure of Formula (1) in present claim 6.

Applicants respectfully disagree.

As claimed in amended claim 1, the present invention is directed to a self-doping type electrically conducting polymer comprising *crosslinked* polymer chains and the crosslinking is

formed through a *sulfone bond* ($-\text{RSO}_2\text{R}'-$). It is not at all clear that the electroconductive polymer of Saida comprises at least partially crosslinked polymer chains, let alone polymer chains crosslinked through a sulfone bond.

Although the Examiner considered that the M^+ in Saida may include one of many monovalent Ar groups (col. 5, lines 24 to 29), M^+ is a cation and bonds SO^{3-} through an ionic bond.

In contrast, in present claim 6, X bonds to B^2 through a covalent bond in the compound represented by formula (1)'.

The difference of the bonding properties due to the difference of the type of bonding is whether the bonding is dissociated in a solvent or not. The compound of Saida is water-soluble and M^+ and SO^{3-} are dissociated in water as a solvent. There is no particular limitation on M^+ in Saida, and Saida teaches that conversion to the specific cation is easily effected by means of an ordinary ion-exchange resin (see column 7, lines 28 to 33 of Saida). This indicates that the polymer of Saida dissociates in water.

In contrast, X and B^2 in the polymer of the present invention are not dissociated in a solvent, and the presently claimed polymer is not water-soluble. It is apparent that the crosslink between the polymer chains, i.e. bonding between X and B^2 , would not be dissociated from the description that "[t]he present inventors have found that the solvent resistance and mechanical properties can be obtained by partially crosslinking self-doping type electrically conducting polymers, and accomplished the present invention. In particular, by crosslinking isothiahaphthene skeleton-containing electrically conducting polymers, the solvent resistance and mechanical properties can be imparted without losing the electrical properties" (see page 6, lines 12 to 19 of the specification).

The co-pending '550 application relates to an antistatic agent in lithographic technology using charged particle beam which can be used as a resist coating material, and teaches that "[a]n antistatic agent for resist is used for imparting temporary conductivity in the time of processing a resist and therefore, it is required that the agent not be insolubilized so that the agent may be easily removed with water or alkali water. ... Also, those having a crosslinkable terminal may be insolubilized during the processing and then cannot be removed. ..." in paragraph [0006]. Saida relates to an electroconductive polymer having a high stability and exhibiting high solubility in water (see column 1, lines 14 to 16 of Saida), which is used for the same purpose as the antistatic agent of the co-pending '550 application. That is, the invention of Saida and the co-pending '550 application has a different application from that of the electroconductive polymer having solvent resistance and mechanical properties of the present invention. Hence, the present invention is a different invention accomplished based on a different concept from that of Saida and the co-pending '550 application.

In view of the above, reconsideration and withdrawal of the §103(a) rejection based on Saida are respectfully requested.

New claim 42 is patentable for at least the same reasons that claim 1 is patentable over the cited references; as discussed above.

Allowance of claims 1, 3-4 and 6-8 and 10-42 is respectfully requested. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,


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CUSTOMER NUMBER

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